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'Torch Plan' Development Strategy in Ninth 5-Year Plan

93P60217A Beijing BEIJING KEJI BAO [BEIJING SCIENCE AND TECHNOLOGY NEWS] in Chinese 27 Mar 93 p 3

[Summary] The "Torch Plan" development strategies in the Ninth 5-Year Plan are: 1) By the year 2000 China will realize a total annual income of 500 billion yuan derived from high and new technologies, industries, and trade. Of this, 400 billion yuan will come from the sale of high and new-tech products that will account for 10 percent of total industrial output value. Foreign exchange earned from export will account for 20 percent of 100 billion yuan gained from annual profits and taxation, and the personnel labor production rate of high and new-tech industries will exceed 150,000 yuan per person per year; 2) China will further improve the quality and quantity of high and new-tech industrial development zones by establishing high and new-tech industrial development belts. A total annual income of 400 billion yuan earned from high and new technologies, industries, and trade will be realized in these belts. Of this, 320 billion yuan will be from the sale of high and new-tech products. Foreign exchange earned from exports will account for 20 percent of 80 billion yuan gained from annual profits and taxation, and the personnel labor production rate of high and new-tech industries in the belts will exceed 200,000 yuan per person per year; 3) By the year 2000 more than 12,000 projects of the "Torch Plan" will be implemented, one-third of them will produce export-oriented products to realize 250 billion yuan from sales of industrial products and 50 billion yuan from profits and taxation, and 50 percent of the products will be manufactured in the development zones; and 4) The number of state-recognized high, new-tech enterprises will reach 12,000, which will eventually grow into high and new-tech enterprise products or consortia with a sales volume exceeding 100 million yuan and 20 of them will be highly competitive in the international market.

State S&T Commission Releases 1992 High-Tech Export, Import Figures

93P60221A Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 12 Apr 93 p 1

[Article by Han Yuqi [7281 3768 3825]: "Nation's High-Tech Product Exports Grow Year After Year"]

[Summary] It has been learned from the State Science and Technology Commission that the nation's exports of high-tech products are continuing to follow the pattern of yearly growth: total high-tech exports for 1992 came to US$3.996 billion, 38.8 percent higher than the figure for 1991. This 38.8 percent growth rate is 20.5 percentage points higher than that for all domestic commodity exports (18.3 percent), marking a major advance in the international competitiveness of domestically made high-tech products. Among the 10 classes of high-tech products covered in the above statistics, computers and communications equipment were the leaders, earning US$1.904 billion in foreign exchange and constituting 47.7 percent of the total high-tech export volume. Life-science-related, aerospace, and electronic products also occupied prominent positions among all high-tech exports.

For 1992, total imports of high-tech products came to US$10.712 billion, US$1.272 billion more than the total for 1991. Here again, computers and communications equipment led the way, constituting 35.7 percent of total high-tech imports. The nation thus continues to have a trade deficit in high-tech product imports/exports, with the largest deficit components being computers and manufacturing technology integration products (deficit of US$2.303 billion). This indicates areas where China is still weak in high-tech products.

CAS Strategy in 1990's Defined

93FE0465A Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 8 Mar 93 p 3

[Article by Yang Lianghua [2799 5328 0553]: "CAS Specifies Strategic Targets for the 1990's"]

[Text] Beijing, 6 Mar—The goals and long-term developmental model of the Chinese Academy of Sciences (CAS) in the 1990's have been defined in the CAS's outline of the Comprehensive Complete Reform Report which was approved by the State Council recently.

These goals are:

—Based on the model of openness, mobility and unity, to establish a group of basic research institutions staffed with advanced researchers, to train a group of scientists at an international level that are capable of competing and striving at the leading edge of world-wide science for the Chinese people, to bring our researchers among the world's front ranks in certain progressive areas such as molecular biology, neuroscience, condensed-state physics, global changes, information science, materials science, nanoscience and nanotechnology, and particle physics. Certain scientific results should be able to meet international advanced standards.

—To establish a networked system of complete long-term experimental observation stations in various ecological areas across the country. This would provide scientific bases and an optimum developmental model for macro policy governing the generalized usage of the nation's resources, ecological environmental protection and continued developments in agriculture.

—To solve certain serious, key scientific issues encountered in the development of national economy. Associated with local businesses, to establish a group of market-oriented engineering centers. Either set up joint ventures or corporations to develop new techniques and processes, in order to contribute to the progress of commercial technologies.

—To become an important base for the nation's high-technology development and exploration, to accelerate the conversion of science and technology accomplishments, to evolve as the breeding ground for new high technology. Create several integrated, export-oriented high-tech business groups each with an annual gross output value exceeding 1 billion yuan. Develop several Silicon-Valley-type small-to-medium high-tech companies.

The long-term goals for the development of CAS in the next few years are: to have a group of research institutions at an international level, and to establish several scientific centers and engineering research centers. Surrounded by some top-quality high-tech business groups closely associated with the institutions, to pursue continuous two-way exchange in capital, personnel, information and research results. The entire CAS system should be fully open to the outside world, maintaining close ties with every element of society.

[Beijing, 6 Mar, additional dispatch by Yang Lianghua]

The Chinese Academy of Sciences (CAS), as the highest academic institution in the field of Chinese science and technology, has presented a project to carry out the Comprehensive Complete Reform Report.

The reforms involve the adjustment of the structure in science research, the personnel system, organizational management, the distribution system and social protective systems, etc. The reforms will take place by priority, by steps, and mutually will form a complete set.

The first step is to widen openness, consolidate staffing, increase the supporting forces, and steadily strengthen basic research. The carefully selected focal points should be set in areas where CAS has done some ground work and those that are active areas in the leading edge of international development. These areas should have strategic meaning in the long-term national economic development, so that CAS will obtain high-quality achievements with international impact through localized superiority in certain important areas.

Within the next 5 to 10 years, the number of permanent research staffers performing basic research will be consolidated to 15 percent of its current level. The number of visiting lecturers and temporary staff, from abroad and at home, will be significantly raised to exceed 50 percent of the regular staff. Research teams which perform basic research in the areas of resources, the environment, and ecology will also be maintained at about 15 percent of current total CAS staff within the next 5 to 10 years. After the staff division, the budget that supports CAS's work will gradually shift to support long-term, fundamental studies.

The next step is to transform the mechanism and to face the market. The need is to enter into the Socialist market economic system with multiple formats and at various levels, so that more than 70 percent of high-tech strength will be poured into the major battlefield of economic development. The applied research organizations of the CAS will gradually turn to business management. Some of these organizations will be combined with business or industries through various formats.

More reforms will also take place in research institutes and academic organizations. Research institutes will become the basic units in the market competition; they will be given more independent authority than before. The academic organizations will be moved away from their original management function—i.e., research only—toward a two-operating-systems-under-one-Academy organization. The purpose is to change their functions, consolidate the organizations, condense the staff and improve efficiency.

CAS Long-Term Development Strategy

93P60217B Beijing ZHONGGUO KEXUE BAO [CHINESE SCIENCE NEWS] in Chinese 22 Mar 93 p 1

[Summary] To establish a market economy with socialist characteristics relying on science and technology, and to meet the growing international competition imposed by intellectual property rights, the Chinese Academy of Sciences (CAS) has adopted a new long-term development strategy: 1) To establish basic research organizations with highly qualified personnel and build a corps of scientists with international standard to compete internationally in molecular biology, neuroscience, condensed state physics, global changes, information science, material science, nanoscience, and particle physics and bring their research results up to the international standards in an open, flexible, and cooperative environment; 2) To establish and perfect a permanent network of observation stations in various geographical areas to provide macroscopic, scientific policymaking for the government, and a system for prioritizing utilization of resources and eco-environmental protection. For short-term goal, CAS is to formulate a strategy to develop technology for use in water-conservancy agriculture and development of red earth in southern China; 3) In order to solve significant key S&T problems arising from the establishment of the nation's new economic system, CAS will collaborate with local governments and industries to set up a group of market-oriented engineering centers and joint ventures to help industries develop new technologies; and 4) CAS will play its full role as an incubator for developing new and high technologies, accelerating conversion of S&T achievements through establishing several market-oriented high and new-tech consortia with output value exceeding 1 billion yuan, and developing a group of small- and medium-sized high and new-tech companies similar to those in Silicon Valley of the United States.

High-Tech Links With U.S. To Be Expanded

40101010D Beijing CHINA DAILY [BUSINESS WEEKLY] in English 26 Apr 93 pp 1, 8

[Article by Xiao Yong]

[Text] China is looking to expand technical trade with the United States despite restrictions placed on hi-tech exports by the latter.

Chinese trade officials say they see huge potential in this regard, as illustrated by growing US corporate investment and technical transfer to China.

One of the US Big Three, Ford Motor Company, is to sign a formal contract soon to set up a joint venture automotive components manufacturing company in Shanghai, an official with the Ministry of Foreign Trade and Economic Co-operation (Moftec) told BUSINESS WEEKLY.

The venture, the first and largest of its kind in China, will have the capacity to supply a wide range of automobile spare parts to the country.

The Moftec official, who requested anonymity, said Ford had agreed to transfer a number of production lines to the Shanghai venture.

Last month, Ford signed a letter of intent with the Shanghai Automotive Industry Corporation to set up a $90-million joint venture to produce plastic and trim products.

Ford also plans to set up a $500-million joint venture with the Shanghai company on research and development centre projects, fuel spray systems, air-conditioning systems and glass systems.

Sources said General Electric is also looking for joint venture projects in China in the petrochemical and electrical appliances sectors.

"We welcome US companies to gear up for technical co-operation with China in virtually all aspects," the official said.

Reliable sources said china is readying a package of incentive measures that will lure big US companies to Chinese markets.

Petrochemical technology may be the most attractive the US has to offer.

"In the meantime, we encourage technical co-operation between medium and small-sized companies in our two countries," the official said.

Moftec figures show US technical exports to China in the first quarter of this year amounted to nearly $100 million in 12 projects.

Last year the US exported a record $1.4 billion worth of high-tech items to China, but the bulk were hi-tech commodities like aircraft, rather than technologies themselves, the official noted.

As a member of the Co-ordinating Committee for Exports to Communist Countries (COCOM), the US has restricted its hi-tech exports to China.

"Although the US has lagged behind Japan, Germany and Italy in technical exports to China, we see it as a key partner in technical trade," the Moftec official said.

He said US companies are showing increased interest in technology transfer to China.

From 1985 to 1992, China imported $4.33 billion worth of US technology.

The Moftec official expected US technology exports to China to at least match the 1992 level, bolstered by a Chinese purchasing delegation that has until now ordered $960 million worth of US automobiles and aircraft.

Former US Secretary of Commerce Barbara Franklin said in Beijing last December that the US "is pushing COCOM to relax control over hi-tech exports to China."

She added: "I'll see to it that my successor understands the importance of the continuity of Bush's policy."

In another development, a senior official with China's State Science and Technology Commission said the two countries have made great achievements in co-operative scientific research.

Jin Xiaoming, deputy director general of the commission's International Co-operation Department, said the two sides are likely to consider commercializing certain results.

But the intention has yet to be finalized by both sides.

He said the joint research has until now largely focused on basic and laboratory subjects.

Since 1979, the two countries have set up 29 co-operation protocols and memoranda of understanding on some 700 projects covering space technology, high energy physics, meteorology, marine and fisheries, water resources, nuclear safety, transportation, surveying and mapping, nonferrous metal and environmental protection sectors.

Jin said the two countries will meet in Shanghai next month to review the collaboration.

The Sino-US scientific and technical co-operation programme, involving at least 10,000 scientists from both sides, is by far the largest of its kind in the world.

Jin implied the envisioned commercialization move would have a significant effect on both economies.

The Beijing Electron Positron Collider exemplifies the benefits of the commercialization trend: China has recently helped South Korea build a similar one based on the model co-developed by China and the US, Jin said.

Sino-Japanese Conference on Software IPR Legal Protection Measures Held

93P60228A Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 14, 14 Apr 93 p 1

[Article by Liu Jiuru [0491 0046 1172]: "Chinese, Japanese Experts Jointly Discuss Software Legal Protection Measures"]

[Summary] On 1 April, Chinese and Japanese experts on computer software legal protection assembled in Beijing's Science Hall for in-depth discussions of international intellectual property rights (IPR) development directions and Sino-Japanese computer software legal protection characteristics, as well as for an exchange of experiences involving international software legal protection and related matters. A group of seven Japanese software legal protection experts led by Japan Software Information Center (SOFTIC) Director Jun Yamamoto came to give lectures during the conference at the invitation of the China Computer Software Registration Office (CCSRO). SOFTIC is a public entity jointly administered by MITI and the Ministry of Education and charged with registration of computer software copyrights in Japan as well as with conducting investigative research in the areas of software legal protection and software dissemination. Director Yamamoto commented to this writer that he pays great attention to software legal protection trends in China and is now researching the general and individual characteristics of China's software protection laws. Chinese experts, including CCSRO Director Guo Chengzhong [6753 6134 1813], had enthusiastic exchanges with their Japanese counterparts, and Director Guo told this writer that he found the conference quite valuable in providing lessons from abroad as well as in furthering the course of international exchanges in the field.

Sino-Indian Scientific Sharing To Expand

40101010B Beijing CHINA DAILY (National) in English 23 Apr 93 p 3

[Text] New Delhi (Xinhua)—China and India yesterday agreed to expand their scientific and technological co-operation.

Science, space and remote sensing, biotechnology, chemicals and electronics, medicine, agriculture and fishery were all earmarked for co-operation at the third meeting of the Sino-Indian Science and Technology Subcommittee this week.

Both sides agreed that science and technology co-operation should focus on application-oriented research projects with direct relevance to economic progress.

The subcommittee decided to intensify joint projects and adopt measures to hasten the transfer of scientific and technological achievements between the two countries.

A record of the discussions was signed at the end of the meeting in the presence of the chairman of the Chinese State Science and Technology Commission, Song Jian, and the Indian Minister of State for External Affairs, R. L. Bhatia.

During a half-hour meeting earlier yesterday, Indian External Affairs Minister Dinesh Singh and Song Jian discussed the importance of bilateral co-operation.

Song, who is a State councillor, spoke highly of the achievements made by India in basic science, astronomy, biology, electronics and micro-electronics as well as in rural economic development.

"The 1990s will definitely see greater development in Sino-Indian science and technology co-operation and I believe that scientists from both countries will make new efforts in this direction," he said.

High Technology Development Course for Yunnan

93FE0467A Kunming YUNNAN RIBAO in Chinese 11 Feb 93 p 6

[Article by He Zhiqiang [0735 1807 1730]: "Orient Toward the Twenty-First Century in the Development of Yunnan's High Technology Industries"]

[Excerpts] [Passage omitted]

(2) Need For Yunnan To Develop High Technology Industries

Not only do developed countries and territories have to develop high technology industries, but developing countries and territories that have not yet begun to develop also must do so.

1. The development of high technology industries is necessary for the attainment of strategic objectives in economic construction. The development of high technology industries has a direct bearing on the realization of strategic objectives. High technology industries represent the most advanced form of productivity. In comparison with traditional industries, they have a higher science and technology content, a higher output value, consume fewer resources, and produce greater economic returns. Statistics show the labor productivity rate of China's handicraft industries and natural economy industries to be no more than 1,000 yuan; the labor productivity rate of traditional industries to be more than 10 times higher than that of handicraft industries in the 10,000 yuan to several tens of thousand yuan range, and the labor productivity rate of high technology industries to be more than 10 times that of traditional industries at 100,000 yuan or more, and in some cases as much as several hundred thousand yuan. If China is to reach a comfortably well-off standard of living within a fairly short period of time and catch up with moderately developed countries, it must energetically develop high technology industries. If it does not, the gap between China and the developed countries will become wider

and wider. By developing high technology industries, Yunnan Province can break convention, skip certain stages in the development of technology, and benefit from the "follow-up effect." The so-called "follow-up effect" means that by learning advanced technology from developed areas, undeveloped areas can accelerate their own development or even surpass developed areas.

2. The development of high technology industries is necessary in order to readjust the industrial structure and the product mix. According to national industrial policy, Yunnan's readjustment of its industrial structure and product mix requires energetic development of its agriculture, energy, transportation, and raw materials industries. At the same time, it requires spurring the extention into the economy of science and technology, efforts made to develop high technology products, export wares, import substitution products, and readily marketable products for a gradual increase in high technology industries as a percentage of all industries, their output value as a percentage of GNP, and their products as a percentage of export wares, the economy thereby developing from extensive to intensive operation.

3. The development of high technology industries is necessary for the transformation of traditional industries. Traditional industries are presently, and will continue for a long time to be, the mainstay of Yunnan's economy; however, with the rapid development of science and technology, the equipment of most traditional industries in the province is becoming out of date and technology is becoming backward. Active use of the fruits of high technology in updating these industries is a realistic way of benefitting more from traditional industries that requires small investment that produces quick results, and provides good returns. Steady improvement of the production process and the level of automation and intelligence of equipment and industrial management in traditional industries is one of the keys to the modernization of Yunnan's industry. We must work from the basis of making the most of our own updating and technical transformation abilities, ourselves acting to bring about a transformation of key areas, in principal production processes, and in the most urgent places, using high technology particularly to advance the technological transformation of key industries.

4. The development of high technology industries is necessary for the building of new mainstay industries. The development of Yunnan's economy rests not only on continued development of agriculture to ensure higher grain yields; continued efforts to gain the most from the country's tobacco, sugar, and tea industries; and greater efforts to build infrastructure, such as transportation and the supply of energy, but also emphasizes development of the phosphate chemical, rubber processing, iron and steel and non-ferrous metal industries, and the forest and paper industries. It also entails creation of conditions for the development of follow-on industries including machinery, optics, electronics, instruments, tourism, condiments, and pharmaceuticals in the gradual formation of a large number of mainstay industries in the province. The new mainstay industries that Yunnan should develop are deep processing industries that will use the province's advantages in raw and processed materials. Therefore, sophisticated technology and equipment must be used for a start in the use of high technology. Unless high technology is used to begin with, conversion of the province's advantages in raw and processed materials into economic advantage will not be easy, and formation of new mainstay industries in the province will also be difficult. This is a matter that must be clearly understood first in the development of new mainstay industries in Yunnan. [passage omitted]

(4) Orientation Toward the Twenty-First Century, Not Losing Opportunities to Develop High Technology Industries in Yunnan

Yunnan has already done the spade work needed for the development of high technology industries.

1. The province has a science and technology corps of fairly high quality and quantity. The province already has more than 600,000 technicians in various fields, including more than 100,000 having credentials in high technology fields. It has 153 natural sciences research institutions covering the main areas of industrial and agricultural production, including research institutions in the biology, metallurgy, chemical industry, and astronomy fields, that are among the best in the country. In recent years, a number of scientific and technical personnel have enlivened the high technology field, and some specialties are developing into the high technology field, thereby laying a certain foundation for Yunnan's development of high technology industries.

2. The province has a number of high technology research achievements to its credit. Between 1978 and 1992, Yunnan won 2,126 province-level or above awards for scientific and technical achievement. Between 1985 and 1992, it obtained more than 1,500 state-approved patents. Some of these achievements were at the advanced national level, and some of them met advanced international standards. In the non-ferrous metal research field, for example, was tests of the high temperature chloridination method of processing low tin, high iron ore from which the separation of tin is difficult, and new technology for the recovery of gold, silver, and platinum from metallurgical copper anode mud. In biotechnology was research on plant gene carrier and acceptor systems, and technology for the separation and purification of plant objective genes and functional proteins. In the field of research on the integration of machine building and electronics, dynamic laser goniometers, and three coordinate measuring machines, advanced levels were reached, some products going into batch production and entering international markets.

3. A number of enterprises that are moving toward the development of high technology developed. After more than 40 years effort, Yunnan has a number of enterprises at a fairly high level of technology in the machinery, electronics, instruments, metallurgy, and chemical

industries. Borne along on the tide of the new technology revolution, they are developing in the direction of becoming high technology enterprises. Examples include the following: The Yunnan Electronics Equipment Plant is one of the state-designated computer production plants. It is the largest computer development, production, and business base in southwest China. The plant employs nearly 800 staff members and workers, half of whom are scientific and technical personnel. The plant has a microcomputer production line at the international level of the 1980's. Its products are widely used in banks, posts and telecommunications, and public finance systems. Sales totaled 125 million yuan in 1992. The B25 series high quality microcomputer that the plant produces has been certified by safety and quality organizations in the United States, Canada, and Western Europe, thereby setting the stage for them to compete in the international market. The largest computer industry group in southwest China—the Nantian Electronics Information Industry Group Corporation—was formally founded on 16 January 1993. Another example is the Kunming Machine Tools Plant, which has become a key enterprise in China's specialized production of large and medium precision machine tools. The more than 200 kinds of new products that they have developed since the founding of the people's republic have been sold in more than 30 countries and territories on five continents, and are world renowned for their high precision and high quality. Sales during 1992 broke the 100 million yuan mark.

4. "Torch plans" have begun to be implemented. Following CPC Central Committee and State Council ratification, the purpose of the "torch plans' is to promote the commercialization, industrialization, and internationalization of the fruits of high technology to spur the formation and development of high technology industries. Yunnan Province has 12 projects that are listed as national level torch plans, and 25 that are listed as provincial level torch plans. Investment in these projects totals 182 million yuan and $1.64 million. Estimates call for scale production within 1 to 3 years, which will add 548 million yuan of new output value each year, produce profits and taxes of 123 million yuan, and create or save $24.24 million in foreign exchange. In addition, the provincial CPC committee and provincial government decided in 1990 to establish a high technology development zone, and after more than 2 years of construction, the Kunming High Technology Industries Development Zone has begun to take shape. In November 1992, the State Council approved it as a national level high technology industry development zone. The development zone uses a flexible operating mechanism, new management method, concessionary policies, and a fine investment climate to attract technology, capital, and human talent from both inside China and abroad for the building of high technology industries that integrate science, industry and trade. Plans call for the development of 250 high technology enterprises in the zone during the Eighth 5-Year Plan that will produce gross earnings of 150 million yuan from technology, industry, and trade and profits and taxes totaling 450 million yuan, as well as save or create $30 million in foreign exchange.

(5) Background to the Selection and Development of Yunnan's High Technology Industries

High technology is of many kinds. Usually it includes electronics information technology, integrated machinery and electronics technology, biotechnology, new materials technology, space navigation and aviation technology, new energy technology, and marine engineering technology. These technologies form an enormous group of industries. Faced with such a large number of high technology industries, which ones should Yunnan choose? This is a question worth looking into.

Our guiding thought has been as follows: Limited goals, breaking of new ground in key areas, making the most of advantages, and step-by-step development. Our policy has been: to use the dominant industries that are developing in the province as the basis, to take domestic and foreign markets as our orientation, to take high and new technology as our support, to take product development as the turnkey, to take improvement of economic returns as the focus, and to take promotion of the modernization of the province's industry as the goal for the development of high technology industries. The principles followed in selecting limited objectives are first: what is in keeping with national industrial policy and technology policy, what is in keeping with the orientation of readjustment of Yunnan's industrial structure, and what is urgently needed for the development of society, science and technology, and society; second is what is in keeping with Yunnan's advantages in resources and advantages in technology in order to spur the formation and development of a group of dominant industries; third is objectives that diffuse and permeate readily that can spur the technological transformation of traditional industries, and that can have a diffusion effect on other areas of the economy; fourth is objectives that have the potential for creating foreign exchange from imports or saving foreign exchange through import substitution; and fifth is objectives that can greatly improve the labor productivity rate and produce marked economic and social benefits.

On the basis of the foregoing guiding thought and selection principles, Yunnan should consider mostly the development of high technology industries in three main fields:

1. Electronics information technology industries and industries in which machine building and electronics are integrated

These two industries have numerous similarities. The technology base for both is electronics technology. Microelectronics technology is the most dynamic technology today. The breadth and depth of its application is unprecedented. China pays extremely close attention to the development of electronics information technology and technology for the integration of machine building

and electronics, citing them as key fields for priority national development. In Yunnan too, these industries have developed fairly rapidly. A research, development and production corps of thousands exists today in these fields, and it has produced a number of fairly high level results. A number of principal enterprises that have fairly advanced technology and equipment are engaged in the batch production of high technology goods that enjoy brisk sales both in China and abroad. We have the capability of making these two industries develop into dominant high technology industries in Yunnan.

2. New materials industries

New materials are the foundation for high technology industries. Yunnan has also done a lot of work in the new materials research field, and it has developed basic research and applied research on many kinds of new materials, particularly in the rare metals materials field where a number of very valuable results have been obtained. We must make full use of Yunnan's advantages in resources and technology, vigorously develop deep processing of non-ferrous metals, do a good job of stretching products, remedy omissions and deficiencies, develop new products, change non-ferrous metals raw materials bases into raw and processed materials bases, and gradually shape a new materials industry in which alloy metal materials, composite materials, superfine metallic power materials, precious metal materials, rare-earth function materials, titanium materials, and diatomaceous earth are put to application in order to bring into play further the advantages of traditional raw and processed materials industries.

3. Biotechnology industries

Biotechnology is directly related to traditional industries such as agriculture, the aquatic breeding industry, pharmaceuticals, foodstuffs, and light industry. Since biotechnology can create new kinds of things, new technologies, and new products, like microelectronics, it is regarded as a splendid high technology industry. In Yunnan Province not only are biological resources extremely abundant, but much work has also been done in the field of biotechnical research and many achievements have been scored. Basic conditions exist for industrial development. We must select fields in which a rather good basis exists for industrialization. First we must use the work that has already been done as a basis for selecting biotechnologies that have prospects for large scale industrial production for the earliest possible fashioning of new industries. Second, we must do more research and development of enzyme engineering and fermentation engineering, using the new technologies of enzyme engineering and fermentation engineering to produce new foods, pharmaceuticals, and fine chemical industry projects.

He Guangyuan, Zeng Peiyuan on Strategy of Developing Electronics Industries

93FE0466A Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese 24 Feb 93 p 1

[Article by reporter Liu Jiuru [0491 0045 1172]]

[Text] At the 1993 National Machine Building and Electronics Industry Working Conference held in Beijing from 15 to 18 February, Minister He Guangyuan of the Ministry of Machine Building and Electronics Industry expounded on a new theme for vitalizing the machine building and electronics industry.

He said that in continuing the policy of carrying out the raising of quality, product variety, standards, and economic performance, the three primary tasks of making genuine adjustments in the product structure, raising the quality of enterprises, and strengthening macroscopic regulation and control must be earnestly pursued, and the two important links central to converting the enterprise management system—making functional changes and establishing uniformity—must be mastered in order to open markets, beef up reforms, and energize machine building and electronics. That is the scope of the theme overall, for revitalizing machine building and electronics.

He Guangyuan said the 14th National Party Congress report was a clear pronouncement: "Energize machine building and electronics, petrochemicals, automobile manufacturing, and the building industries, and make them the pillars of China's economy". That was the first time that the machine building and electronics industry has been given the importance of a pillar industry. The chief managing departments of the machine building and electronics industry must deal with the competing imperatives of the machine building and electronics industry, furthering the theme of invigoration, setting up a new strategy on the principle of making important breakthroughs, defining new growth targets for China's economic development.

He Guangyuan explained that by 2000, the gross output value and total profit tax value of the machine building and electronics industry will reach 970 to 990 billion yuan and 53.7 to 54.7 billion yuan, respectively, and its earnings from exports will rise from 19.5 billion U.S. dollars in 1992 to 40 to 50 billion U.S. dollars, which will amount to 30 to 40 percent of total national exports; the key pillar industries product design and manufacturing technology will reach the 1980's level of developed countries, and 40 percent of machine building and electronics products will be at the early 1990's level of developing countries, and large- and middle-sized enterprises will have begun converting to the stock system.—Reporter Liu Jing [0491 5464]

At the National Machine Building and Electronics Industry Working Conference, the Standing Vice Minister of the Ministry of Machine Building and Electronics Industry, Zeng Peiyan, made an important speech before

the Sub-Group Symposium of the Electronics Group, addressing several major questions concerning the future development of the Chinese electronics industry.

Zeng Peiyan said that the electronics industry will be vitalized as a leading pillar industry in the national development strategy. In policy measures, support will favor electronics, and investments of over 18 billion yuan for key electronics industry projects in the Eighth and Ninth 5-Year Plans are planned, about equal to the total of national investments made for the electronics industry during the 35-year period before the Eighth 5-Year Plan. Therefore, says Zeng Peiyan, the electronics industry must seize the opportunity and accelerate its development, and thoroughly engage the following points:

First, there must be an all-out effort to develop the electronics market. Thinking must be changed toward using the market system to stimulate enterprises to broaden their markets, and efforts must be put into developing the information technology as the leading third industry; and at the same time, an electronics market system must be established and perfected for products, funds, technology, labor, and information. Second, the industrial structure must be adjusted, and the problems of duplication and decentralization must be resolved, creation and development of economies of scale must keep moving forward, and adjustment of the enterprise organization structure must be accelerated in the direction of the "large corporation strategy" and stock enterprises. Third, the link between speed and profit must be properly handled, and wasteful haste must be avoided. Fourth, there must be active participation in international industrial cooperation and sharing, and exports must be broadened, more importation of advanced technology and foreign funds must be actively prusued. Fifth, the military electronics industry must be developed.

In addition, Zeng Peiyan also proposed furthering the conversion of government functions, making the new administrative structure responsive to a market economy, and making macroscopic regulation and control appropriate to the needs of new operational systems.

CAS, Tianjin Sign S&T Cooperation Accord

93FE0466B Beijing GUANGMING RIBAO in Chinese 15 Jan 93 p 1

[Article by reporter Lu Qingzhi [6424 3237 2655]]

[Text] The Tianjin Municipal Economic Commission has announced that direct cooperation between the highest levels of leadership of Tianjin Municipality and CAS in using high-technology to convert traditional enterprises, adjust product structure, and progressively establish a group of new enterprises of high density S&T and technical know-how has been very successful.

Tianjin Municipality, on the crest of the "S&T promotes industries," began cooperating in S&T with CAS in 1984, and in the last 3 years, especially since last year, raised the cooperative effort to a completely new stage of development. The cooperation has moved from the turning over of individual laboratory results to enterprises and inviting bids for tasks, to a stable long-term full-scale cooperation under the leadership of a unified organization, and formed a high-level, manifold, cooperative force for scientific research and production, especially in the area of state-supported large- and middle-sized pillar enterprises. The implementation of reciprocal support between CAS institutes with their S&T specialties and the great variety of excellent industries and enterprises has already had a one-plus-one-greater-than-two result. Data cards and full-scale electronics facilities are close on the heels of international levels, and bring along a range of associated technologies and new products in related technologies and enterprises that are high-tech, high-value added, in needed high volumes, that have low consumption and non-polluting features, whose spread is of major significance for reforming many businesses. The strength of applied R&D of the CAS Shenyang Institute of Automation and other units involved in the development of data cards and facilities is very strong; and the Tianjin People's Printing Factory has formed an independent annual output capability of 18 million cards by importing foreign facilities. On that basis, when the two parties went into cooperative development, operations went on smoothly in establishing a new industry to produce magnetic cards and electronics equipment for financial use.

In order to raise the cooperative effort to an even higher level, last year, Tianjin and CAS again signed a 5-year agreement to "promote closer ties in S&T and production." CAS President, Zhou Guangzhao, took a group of leaders on a special trip to inspect Tianjin enterprises, held talks with Tianjin Municipal Committee Secretary Tan Shaowen and Mayor Nie Bichu, and set down a full-scale cooperative S&T policy directed at Tianjin Municipality's conditions, identified eight areas and 51 projects for consummate action, including: "Lantian No 1 high-grade digital control system industrialization," "pentaxial ganged numerical-control laser processing center," and "magnetic card and full-scale electronics facilities."

The cooperative projects were carried out by the CAS Applied Technology Bureau and the Tianjin Economic Committee, unified plans were set and cooperative projects were organized on three levels: national S&T target projects, key cooperative projects and industries between the city and the Academy, and joint projects between enterprises and research institutes.

In order to create an overall cooperative environment, Tianjin Municipality formulated over 40 preferential policies and measures, including awards for technicians who make outstanding contributions, improved technical personnel's wages, raised the tax base of the individual adjustment tax plan, and exempted scientific

research institutes (including headquarters) from taxes on energy and transportation funds, bonuses, etc.

China To Establish 50 State Engineering Research Centers in Next Decade

93FE0465B Beijing GUANGMING RIBAO [GUANGMING DAILY] in Chinese 6 Jan 93 p 1

[Article by Liu Lusha [0491 6424 3097] and Liu Qin [0491 0530]: "China To Establish 50 State Engineering Research Centers"]

[Text] Based on a 2-year trial period, the State Planning Commission has started a project to establish State Engineering Research Centers (SERC) in 1992 in order to help convert science and technology accomplishments into productivity and to strengthen the nation's independent industrial development capability and market competitiveness. To date, seven SERCs have been established across the country. The plan is to establish about 50 SERCs in key areas of the nation's developing industries during the Eighth 5-Year Plan and the early stages of the Ninth 5-Year Plan.

How does one accelerate the conversion of science and technology accomplishments into productivity? That is one of the important problems that the nation is facing in the development of the national economy as well as in science and technology for the nineties. In order to convert laboratory results into industrial production, a series of comprehensive works such as process design, equipment manufacturing, etc., i.e., industrialization, have to be completed. In general, our nation's research organizations are deeply in need of capabilities and capital to implement the industrialization of science and technology accomplishments. It is also difficult to carry out the industrialization in the industries themselves because they don't have the mechanism of self-development. Industrializing science and technology accomplishments is a weak point in the process of conversion which needs to be improved. The establishment of the SERCs is designed to solve this problem. This means a reform of the science and technology system as well as of the economic system; it is a measure intended to improve the association of science and technology with the economy.

The SERCs are mainly to be established in industrial research organizations, in universities and in large businesses. They will be relatively independent research and development entities. Their major function will be to conduct engineering research and systems consolidation in the key and common technologies of the developing industries. They will then make scientific and technological accomplishments practical in technique, reasonable in economy and realistic in engineering in order to continuously provide complete sets of technologies, processes and semi-tested samples for the industries and markets. A board of directors or management committee, consisting of representatives from industry and other research organizations, will be set up within the SERCs to form a tight cooperative relationship with industry. Industry will participate in the establishment and management of the SERCs and will have priority in sharing the results of the SERCs. SERCs will pinpoint their research and development toward meeting the needs of industry and the market. Together with industry, they will form a benign cycle of "research, development, products and markets."

About 50 SERCs will be established during the Eighth 5-Year Plan and the early stages of the Ninth 5-Year Plan. They will engage about 500 medium-to-large businesses or around 50 large industrial groups, based on market demand, in converting hundreds of important science and technology accomplishments every year.

New High-Tech Zone Planned for Jiading

40101010C Beijing CHINA DAILY [BUSINESS WEEKLY] in English 26 Apr 93 p 4

[Article by Zhang Yu'an]

[Text] The Jiading District of Shanghai has unveiled a plan to build one of the country's major high-tech industrial development zones by the end of this century.

Wang Zhongming, magistrate of the district government, said last week in Beijing that the plan makes full use of Jiading's skilled personnel and favourable geographic conditions.

There is a strong technical force in the district, including 7,000 personnel in special fields. Located in the district are the Shanghai Science and Technology University and the Shanghai Nuclear Energy Institute, the Shanghai Institute of Optics and Fine Mechanics and the East China Computing Technology Institute under the Chinese Academy of Science and Technology.

From the Shanghai Hongqiao International Airport to the district is only 30 minutes drive.

Lured by the technical advantages as well as preferential treatment, some big-name overseas companies are currently negotiating with local firms to commit large sums of money in high-tech sectors. General Electric Corporation of the United States is just one of them, Wang disclosed.

The district encourages foreigners to invest in non- or low-pollution high-tech projects. It also provides more preferential treatment on land than other sectors to foreigners investing in the district in the next 2 to 3 years.

At the moment, the district, formerly Jiading County, is focusing on construction of the Jiading Industrial Development Zone, a high-tech industrial town and an automobile production centre where the Sino-German joint venture Volkswagen automobile corporation is located, Wang said.

To substantially improve its investment environment, the district has decided to build 10 large infrastructural facility projects in the coming few years, including coal, gas and thermal power capacity expansion projects, telephone system expansion, buildings for customs, commercial and financial centres, water supply and waste water treatment projects, a residential building area and highway and local railway construction, Wang said.

Copyright Law Now Comprehensive

40101010A Beijing CHINA DAILY (National) in English 20 Apr 93 p 3

[Text] China is to sign about 300 copyright contracts with foreign publishers in the coming 2 months, the State Copyright Bureau revealed here yesterday.

The business will run between the Copyright Agency of China (CAC), the sole government institution handling Sino-foreign copyright trade in China, and dozens of publishing houses and companies in the United States, Russia, Italy and Canada.

Some renowned foreign publishing giants will be involved, according to Tao Qingjun, deputy general-manager of CAC, including the Gulf Publishing Company in the United States, Cambridge University Press in Britain, la Ypiga Meravigli in Italy, and la Courte Echelle Inc. in Canada.

The contracts will allow CAC to represent foreign authors to settle copyright disputes in China and benefit the circulation of Chinese works overseas, thus providing bilateral protection for both Chinese and foreign copyrights.

The contracts will mainly cover books and periodicals on science, culture and society.

"The activity indicates China is earnestly fulfilling international copyright obligations," Tao said.

China joined the Berne Convention and World Copyright Convention last October, after signing a bilateral intellectual rights protection agreement with the United States last January.

So far China has signed dozens of copyright trade contracts with foreign publishers and built official connections with publishing bodies and copyright agencies in the United States, Britain, Canada, Japan, Russia and Hungary.

However, with a history of only about one year and facing money and personnel shortages, China's international copyright business faces heavy tasks ahead.

Before 1992, CAC mainly handled copyright business among the mainland and Taiwan, Hong Kong and Macao.

Overseas copyright owners may have their interests protected by contacting CAC or China's administrative organs, or even launching lawsuits in the courts if they find their copyrights are violated in China, officials at the copyright bureau said. (Xinhua)

Investigation of Very-Low-Frequency Piezoelectric PVDF Composite Hydrophone

93P60223A Beijing DIANZI XUEBAO [ACTA ELECTRONICA SINICA] in Chinese Vol 21 No 3, Mar 93 pp 102-105

[Article by Yuan Yiquan [5913 2496 0356] of Southeast University, Nanjing 210018: "Research on Very-Low-Frequency PVDF Piezoelectric Composite Hydrophone Attached to Inside Surface of Cylinder," supported by grant from State Open Laboratory for Sensor Technology; MS received May 91, revised Feb 92]

[Abstract] A new piezoelectric polyvinylidene fluoride (PVDF) composite hydrophone attached to the inside surface of a cylinder has been developed. This type of hydrophone is characterized by high sensitivity, low response to acceleration, and ability to bear high pressure. In this paper, the theoretical expressions are given and are found to be in agreement with measured results. The hydrophone made by this new method is advantageous for use in towed arrays and sonobuoys.

Figure 1 [not reproduced] shows the coordinate system and cross sectional view of the cylinder; in the figure, b is the outer radius, a is the inner radius, and L is the length. The PVDF thin film (thickness 75 μm) and the glue layer (thickness 5 μm) are both less than the vibrating shell thickness (b - a). Table 1 below, giving data measured and provided by the China Testing Technology Research Institute in Chengdu and the National Defense Marine Acoustical Metrology Class-1 Station in Hangzhou, compares the technical performance of three independently developed models (PCH-I, PCH-II, and PCH-III) with that of two U.S.-made hydrophone models (AQ-2 and AQ-4). Figure 2 below is a graph of the sensitivity frequency response of the model PCH-II under high static water pressure (0.1 MPa - 2.0 MPa). Table 2 (not reproduced) is a comparison of sensitivity M against phase for two different PCH-III hydrophones tested, while Figure 3 [not reproduced] shows the axial acceleration frequency response for the PVDF hydrophones for varying acceleration.

Table 1. Comparison of Three Domestic Models With Two U.S.-Made Models

Model	Sensitivity (dB*)		Acceleration response (dB**)		Resistance to static water pressure at depth (m)		Capacitance (pF)	2b/L (wall thickness) (mm)	Weight (kg)
	Theoretical	Measured	Theoretical	Measured	Theoretical	Measured			
PCH-I	-190	-191	-78	-79	300	200	3360	φ30/ 46(1.00)	
PCH-II	-194	-194.4	-79	-80	450	200	6860	φ28/ 59(1.50)	
PCH-III	-195	-195.5	-75	-76	450	300	7200	φ25/ 40(1.10)	17.5
U.S. AQ-2	-197		-60		1700		3500	φ25.4/33	15.4
U.S. AQ-4	-201		-70 to -60		1700		2400	φ33/37	54

* 0 dB = 1 V/μPa;

**0 dB = 1 V/g, (Determined at 100 Hz)

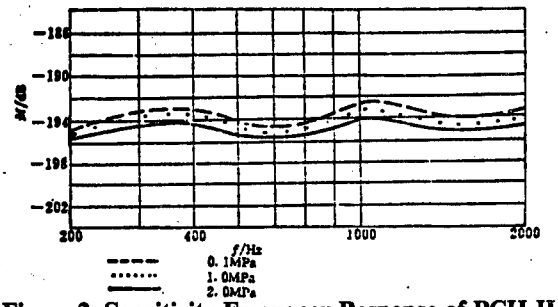

Figure 2. Sensitivity Frequency Response of PCH-II Hydrophone at High Static Water Pressure

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Achievements in Biotechnology

93P60218A Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 25 Mar 93 p 1

[Article by Xu Jiuwu [1776 0046 2976]]

[Summary] Driven by the State "863" Plan, Key Project Incentive Program, and Torch Plan, China has built a corps of 40,000 biotechnologists. A bumper harvest of research results in agricultural, medicinal and pharmaceutical research has been obtained. In agrobiotechnology, at least three ideal sterile strains of paddy rice have been screened, tests on new high-yield, high-quality hybrids are underway, and transgenic plant research on insect-resistant cabbage, mustard, tomato, tobacco and potato plants, and test-tube oxen research have attained world standards. Genetic engineering research on swine fever and rapidly grown carps, development of nitrogen fixation technology and other agrobiological technologies are making progress. Especially worth mentioning is the implementation of "Plant Gene Mapping Program." In pharmaceutical biotechnology, China has developed four kinds of high-tech pharmaceuticals and are already sold in the market in Southeast Asia. They are genetically engineered human 1b interferon for external use, generally engineered human 1b interferon for injection, genetically engineered human 2a interferon injection, and hepatitis B vaccine. Now five research institutes for biological products are engaged in producing hepatitis B vaccine. Project on genetic-engineering alkali fibrinogen growth factor R&D is underway and is being put into intermediate testing soon. The burgeoning biotechnology industry will soon bring fortune to China.

Domestic New Drugs Production Highlighted

40101011A Beijing CHINA DAILY (National) in English 20 Apr 93 p 3

[Article by staff reporter Zhu Baoxia]

[Text] China is to increase its budget for developing new medicines from this year.

The policy is targeted at setting up an advanced domestic new drugs research network. The move is aimed at putting an end to the flood of fake foreign-style medicines and at creating drugs for the international market.

According to an official from the State Pharmaceutical Administration, some 23 million yuan (about $4 million) will be invested in the field each year, an increase of around 20 million yuan (about $3.5 million).

The State Pharmaceutical Administration hopes that by the year 2000, some 10 new medicines will be created, manufactured and sold worldwide.

Lai Qinglian, project manager of the Center for New Drugs Research—led by the State Science and Technology Commission—said the country has seen great advances made in the pharmaceutical industry since the founding of the People's Republic of China in 1949.

Capacity

The country now has a pharmaceutical production network capable of turning out 200,000 tons of various chemical medicines each year.

The network is composed of more than 2,700 pharmaceutical factories, with fixed assets valued at 19.7 billion yuan ($3.4 billion).

Newly founded 410 foreign-funded pharmaceutical enterprises have absorbed $500 million in foreign investment and imported a variety of new products and techniques.

What awfully troubles the country's pharmaceutical administrators is the country has not yet established a research system capable of creating new drugs; quite a number of domestically manufactured medicines are foreign-style imitations.

Of the 783 varieties of medicines produced and marketed in 1990, 97.4 per cent were imitations of foreign products.

Few domestically researched new drugs have been granted patents in developed countries.

However, the revised Patent Law and medicine administration protection regulations, put into effect this January, forbid imitations.

The State Pharmaceutical Administration has gradually given priority to medical research and a new medicine research fund was founded in 1987. The work won support from many other State establishments, including the Ministry of Public Health, the Chinese Academy of Sciences and the State Science and Technology Commission.

By the end of 1992, the central government had pumped in 6 million yuan (more than $1 million), while the State Pharmaceutical Administration and pharmaceutical enterprises also collected 4.5 million yuan (about $700,000) for researching new medicines. The cash has assisted 100 new medicine research projects.

Two of the assisted projects have applied for new medicine certificates and production licences and a number are receiving clinical tests.

Hemophilia Gene Therapy

93P60218B Beijing JIAN KANG BAO [PUBLIC HEALTH NEWS] in Chinese 12 Feb 93 p 3

[Article by Jiang Wei [1203 1792]]

[Summary] The first successful gene therapy has been developed by Professor Xue Jinglun [5641 0079 0243] of the Institute of Genetics of Fudan University and phase I clinical trial is being conducted in Changhai Hospital, which is affiliated to the Second Military Medical University, to treat two hemophilia patients. To date these are the only two cases of hemophilia patients being

successfully treated worldwide. Aiming at bringing patient's complete coagulation capability back and eventually cure the disease, in 1987 Professor Xue started his research with constructing vectors carrying normal human coagulation factor gene to infect fibroblast culture prepared from patient's skin cell for high expression and mass production of normal human coagulation factor gene. The "processed" cells containing normal human coagulation factor gene were then embedded in collagen and injected subcutaneously into patient's abdominal wall or back muscle. The "processed" cells replicate in patient's body to produce higher concentration of thromboplastin protein to correct the patient's factor-deficiency problem and resume patient's normal coagulation function. Since 1992 the research result has been put into clinical tests in Changhai Hospital, dramatic improvements have been obtained from two brothers who had been suffering from hemophilia and relying on blood transfusions. After giving four doses of the "processed" cells, the two patients' knee bleeding and muscular dystrophy problems have disappeared, and since the concentration of coagulation factor in their body doubled, the coagulation capability has been enhanced tremendously. So far no blood transfusion has been given to the two patients since the therapy began, also no side effects have been observed. The achievement has brought China into the world advanced level in using gene therapy to treat hereditary diseases.

Scorpion Venom Research

93P60218C Beijing ZHONGGUO KEXUE [SCIENCE IN CHINA-SERIES B] in Chinese Vol 23 No 1, Jan 93 pp 46-52

[Article by Ji Yonghua [0679 3057 5478], Xu Ke [1776 4430], CAS Institute of Physiology, Shanghai; P. Mansuelle, C. Granier, C. Kopeyan, H. Rochat, Laboratorie de Biochime, CNRS URA 1455, INSERM U 172, Faculte de Medecine Secteur Nord, Bd Pierre Dramard, 13326 Marseille Cedex 15, France; S. Terakawa, National Research Institute of Physiology, Okazaki, Japan; Study on primary structure of neurotoxin Bmk IT purified from East Asia scorpion Buthus martensi Karsch]

[Abstract] Researchers in China are trying to study the primary structure of amino acid sequence in insect neurotoxin BmK IT obtained and purified from East Asia scorpion Buthus martensi Karsch by the Institute of Physiology of the Academy of Sciences in Shanghai. Scorpion venom has been identified to contain two kinds of neurotoxin—the mammal neurotoxin attacking specifically on mammalia, and the insect neurotoxin specifically on insect. Recently researchers are paying more attention on the study of insect neurotoxin derived from scorpion venom. Two types of scorpion insect neurotoxin have been identified: CP type is the one which causes contractive paralysis (CP) to insects, and FP type is the one which causes flaccid paralysis (FP) to insects. Similar to mammal neurotoxin, insect neurotoxin attacks specifically on the passage of sodium ions in the membrane of insect's nerve cell. The molecule of either CP type or FP type is mainly composed of 61-70 single-chain amino acids with four pairs of disulfide bonds. To date, five known CP type neurotoxins—AaH IT, AaH IT_1, AaH IT_2, Lqq IT_1, and Lqq IT_1 [as given]—and three known FP type—LqH IT_2, Lqq IT_2, and Bj IT_2—have been purified from African scorpions Androctonus australis Hector and Leiurus quinquestriatue. Study on AaH IT_4 and LqH IT obtained by cDNA recombinant technique is still underway. Results of this research indicate that BmK IT belongs to CP type, and its amino acid sequence is similar to AaH IT. The following is a chart to give one-on-one comparison of amino acids in BmK IT and AaH IT:

The study of primary structure of amino acids in BmK IT has provided researchers more information to further study the scorpion neurotoxin and develop new kinds of biological pesticides.

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                  1         2         3         4         5         6         7
         1        0         0         0         0         0         0         0
AaH IT   KKNGYAVDSSGKAPECLLSNYCNNQCTKVHYADKGYCCLLSCYCFGLNDDKKVLEISDTRKSYCDTTIIN
BmK IT   KKNGYAVDSSGKVSECLLNNYCNINCTKVYYATSGYCCLLSCYCFGLDDDKAVLKIKDATKSYCDVQ...
Native
Protein  KKNGYAVDSSGKVSE.LLNN.....:.....:.....:.....:.....:.....:.....:.....
RCM-
Protein  KKNGYAVDSSGKVSECLLNN.....:.....:.....:.....:.....:.....:.....:.....

No.7                VSECLLNNYCNINCTK
No.1                                VYY
No.3                VSECLL            ATSGYCCLL

No.5                                  ATSGY     SCY
No.8                                              CFGLDDDK
No.6                                                       AVLK
No.9                                                           IKDATK
No.2                                                                 SYCDV.

Pep.5                                                                ATKSYCD
Pep.8                                                                      VQ...
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Figure 2.

Cray Research Markets Y-MP Vector Supercomputer Series in China

93P60230C Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 14, 14 Apr 93 p 3

[Article by Shen Haiying [3088 3189 5391]: "Cray Holds Forum in Beijing on Petroleum Exploration and Supercomputer Technology"]

[Summary] U.S. supercomputer giant Cray Research recently held a "Petroleum Exploration and Supercomputer Technology" forum in Beijing to introduce to Chinese petroleum industry users the firm's traditional mainstream systems, the Cray Y-MP series of vector supercomputers. This series, including a total of six models (Y-MP/EL, Y-MP/2E, Y-MP/4E, Y-MP/8E, Y-MP/8I and Y-MP/C90), is Cray's traditional mainstream model group representing today's highest-performance vector supercomputers. Since the late Eighties, when the series was first marketed, over 100 units have been installed worldwide, capturing 85 percent of the entire supercomputer market. At the forum, Cray especially unveiled its improved EL model intended for the Chinese market: the Y-MP/ELC. It is understood that the Y-MP/EL and Y-MP/2E are to receive export permits for delivery to users in China. Besides petroleum exploration, the Y-MP supercomputers have many applications in areas such as space, the automotive industry, and government. Cray's Y-MP and S-MP series supercomputers will have a major influence on the development of China's petroleum exploration technology.

State Parallel Computer Engineering Technology Research Center Established

93P60235A Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 29 Apr 93 p 1

[News brief by Liu Liu [0491 3461]: "State Builds Parallel Computer Research Center"]

[Text] The State Parallel Computer Engineering Technology Research Center, organized and built by the CAS, was recently established in Beijing. This center's activities will revolve around parallel computer hardware and software development, sales, service, and related work, so that this high technology can be gradually commercialized and industrialized. The center's resources will be open to the entire nation. Center scientists and engineers are now engaged in developing a 1 GFLOPS (billion floating-point operations per second) computer.

Zhongruan Corp. Markets Copyrighted Chinese-English MTS

93P60230B Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 14, 14 Apr 93 p 1

[Article by Shui Tu [3055 0960]: "Zhongruan Corp. Markets Chinese-English Machine Translation System"]

[Summary] The Zhongruan Corporation, following upon its release [a few years ago] of the Yixing English-Chinese machine translation system (MTS), recently began marketing a copyrighted Chinese-English MTS. This system runs on a 286 microcomputer or higher-performance machine with 20 Mbytes of hard-disk external storage and a VGA display card. As tested on an Ergo 486/33 microcomputer under a Sinicized DOS environment, the system has the following speeds: for ordinary general-purpose dictionary words, translation speed can be as high as 10,000 words/hour; for phrases (of up to 15 Chinese characters) used in short Chinese texts (1000 words or more) that are pre-edited, actual translation speed is over 6000 words/hour. In terms of translation accuracy, based on the ABC category method (where category A indicates reading of the translated text immediately communicates the Chinese words to you, category B indicates that knowledge of the Chinese language must be drawn upon to understand the translated text, and category C indicates fundamentally unintelligible translated text), readability is about 60 percent. If the built-in phrase dictionary is employed, readability can be noticeably improved. Besides the general-purpose dictionary, the system also includes a naval and merchant-marine specialized dictionary.

Kuai Yitong EC863A Pocket-Sized English-Chinese MTS on Market

93P60230A Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 14, 14 Apr 93 p 1

[Article by Jian Zhong [1696 0022]: "Pocket-Sized Electronic Translation Machine: Market Prospects Bright"; cf. JPRS-CST-93-005, 22 Mar 93 p 38 and JPRS-CST-93-006, 6 Apr 93 p 29]

[Summary] The world's first pocket-sized electronic translation machine, the "Kuai Yitong EC863A," is now formally on the market. This intelligent English-Chinese machine translation system (MTS), developed by a research team led by Dr. Chen Zhaoxiong at the CAS Institute of Computing Technology's Intelligent Machine Translation Center, can employ logical thinking—based on combined operations involving uncertain inferential algorithms—to translate English sentences and short phrases. The system includes 100 Kbytes of RAM, and has an average sentence translation time of about 5 seconds. So far, this advanced technology has created direct economic benefits of US$4.44 million for the State. In addition to translating full English sentences, this machine has a frequently used word base for two-way English-Chinese/Chinese-English translation, and can generate clear and accurate pronunciations for English and Putonghua [i.e. standard Mandarin Chinese].

Intelligent English-Chinese S&T Machine Translation System Developed by Tianjin University

93P60220A Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 12, 31 Mar 93 p 2

[Article by Shao Xianhua [6730 0341 5478]: "Tongyi Machine Translation System To Go on Market"]

[Summary] The "Tongyi [6639 6230] DT-1801" intelligent English-Chinese S&T machine translation system (MTS) developed with a 370,000-yuan investment over a 2-year period by Tianjin University's Datong [1129 6639] S&T Development Co. will soon be on the market, becoming one of the first domestically commercialized MTSs. The Tongyi, which runs on 286 and higher-performance microcomputers and under all Chinese-character operating systems, has a 100,000-term general-purpose S&T dictionary for fields such as electronics, machinery, petroleum, chemical engineering, energy resources, medicine, trade, finance, telecommunications, environmental science, remote sensing, earth sciences, and broadcasting/film/video, as well as a 700,000-term specialized S&T dictionary. According to expert testing, the Tongyi's accuracy can be higher than 90 percent, surpassing the performance of other MTSs currently being developed by other domestic R&D firms.

First Domestically Developed Internationally Large-Scale Software Unveiled at USTND

93P60220D Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 13, 7 Apr 93 p 1

[Article by Tan Keyang [6223 0344 2254]: "China Develops First Internationally Large-Scale Software: 'Macintosh System 7.1 (Cube-E) Simplified-Chinese-Character Version' on Market"]

[Summary] The Galaxy Computer Industries Co. of the University of Science and Technology for National Defense (USTND, also known as Changsha Institute of Technology) recently developed the nation's first internationally large-scale software product, the "Macintosh System 7.1 (Cube-E) Simplified-Chinese-Character Version." This system is a critical element in the U.S. firm Apple Computer Inc.'s "Wild Duck Plan" (i.e., Apple's development plan for opening up the China computer market). This software's unveiling is a great success story for Chinese computer software entering the international market and will provide valuable experience for China's participation in international computer high-tech circles.

China Goes On-Line With Four Major International Information Networks

93P60235b Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 1 May 93 p 3

[Article by Liu Qinglu [0491 1987 4389]: "Nation's Information Networks Realize International Connections; China Becomes Member of Four Major International Information Networks"]

[Summary] Tianjin, 30 Apr (XINHUA)—China has now gone on-line with four major international information networks in lthe area of international economics, technology, and trade. According to Wang Lianhai [3769 6647 3189], Director of the China State authority for the U.N. Technical Information Promotional System (UNTIPS), China is now a formal member of the following four systems: UNTIPS, the U.N. Industrial Development Organization's "Industrial and Technical Information Base System," the EC's Commercial Cooperation Center, and the European Information Center. These international information organizations have set up offices and agencies in Beijing, and have built central stations in 20 cities including Tianjin and Taiyuan. Over 10,000 pieces of information per year are transmitted via computer networks to each central station; also, each station can send almost 1000 pieces of information per year onto the international networks. It is understood that there are already over 10,000 domestic users of these four networks. Via information supplied by these systems, a trade volume of over US$60 million was reached last year.

Reports on Multimedia Systems

Digital Multimedia Development System

93P60227A Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 14, 14 Apr 93 p 1

[Article by Hou Meizhu [0186 2734 4554] and Du Haiping [2629 3189 5493]: "Qinghua University Markets First Digital Multimedia Development System"]

[Summary] The "digital multimedia development system THdmds" developed by Qinghua (Tsinghua) University's Computer Department and Great Wall Computer Corp. passed formal technical appraisal on 25 March. THdmds, which has applications in several creative processes such as interactive multimedia, multimedia demonstrations, and information consultations, runs on an IBM 386/486 with a VGA monitor and a 100 Mbyte hard disk. It incorporates advanced digital video interactive (DVI) technology with added Chinese-character processing and Chinese text-speech conversion functions. The system accepts color scanner input and includes nondestructive image compression algorithms. Its AVstar creative tool includes a user interface manager/editor, a multimedia instruction interpreter, audio/video broadcast playback software, image format conversion software, and management software with a variety of Chinese-character fonts.

768 Multimedia System

93P60227B Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 14, 14 Apr 93 p 2

[Article by Hai Ping [3189 5493]: "Domestically Made Multimedia System Provides Service at Major Exposition"]

[Summary] The "768 Multimedia System," developed by Beijing Qilefa [7871 2867 4099] Multimedia Great World Ltd. was installed at all entrances to the China International Exposition Center for the '93 Beijing International Fair (2-8 April), where it provided information consultation services. This system, with a 386DX/33 or 486DX/33 for its host, includes a 14-inch touch screen (for all interactive input—no computer keyboard or mouse is used), an externally connected TV projection screen, and other hardware, and is especially suited to text/image/sound demonstrations, information queries and military C^3I applications.

Multimedia DBMS

93P60220B Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 12, 31 Mar 93 p 15

[Article by Wang Wei [3076 0251]: "Zhejiang Precision Instruments Corp. Develops Multimedia Database Management System"]

[Summary] The Zhejiang Province Precision Instruments Corp. recently announced its development of a multimedia database management system (ALPHA edition) which can run in both single-user and networked multiuser modes. This multimedia DBMS runs under the popular Chinese-version MS Windows 3.X GUI (graphical user interface) operating system environment and uses the SQL database query language. The system's strong graphics functions are indicated by its ability to do calculations on 640 x 480 x 256-pixel color frames, and store at least 3,000 frames in memory; combination processing of large quantities of Chinese characters and graphics is easily accommodated.

Computer Video Signal Grabber

93P60220C Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 12, 31 Mar 93 p 19

[Article by Ji Fenghua [4694 7685 5478]: "Qinghua University Develops Multimedia Computer Video Signal Grabber"]

[Summary] The "multimedia computer video signal grabber (TH-Video)" developed by Qinghua University as a State 863 Plan project (863-306-03-08-02) recently passed expert appraisal. The TH-video signal grabber, incorporating new digital decoding and digital phase-locked-loop circuits, has a three-channel input for PAL and NTSC formats. Input channel selection and input format conversion can be easily programmed via software. Via a program for the video window controller, TH-video can implement the following functions: display full-screen dynamic imagery on a VGA monitor, and control window position and size via independent X and Y coordinates and color-key switch signals. Image resolution is 1024 x 512 pixels, with Y:U:V = 8:2:2.

Tactical Advantages of Quasi-Wideband Phased Array Radar

40100079B Beijing DIANZI XUEBAO [ACTA ELECTRONICA SINICA] in Chinese Vol 21 No 3, Mar 93 pp 86-91

[English abstract of article by Zhang Zhizhong of the 14th Institute of Ministry of Machine-Building and Electronic Ministry, Nanjing 210013; MS received Sep 91, revised Jul 92]

[Text] Due to the rapid development of the Very-Large-Scale Integrated Circuit (VLSIC) and its decreasing price annually, the cost of phased array radar is no longer a deadly obstacle for the designer or user. One can be sure that phased array radar, especially the solid state ones, would be very cost-effective in the complex situation in the 1990's, and wideband phased array radar has advantages in its performance making it suitable for many specific uses. In this paper, we separate the wideband into two categories: those only using a phase shifter are defined as quasi-wideband and those needing both phase shifter and real-time delay line are defined as wideband. We point out that quasi-wideband has many advantages and therefore could be most properous radar system in the coming decade, and wideband phased system would be only used in some limited special situations.

Electromagnetic Leakage From Shielded Video Cables in Computer Systems

40100079A Beijing DIANZI XUEBAO [ACTA ELECTRONICA SINICA] in Chinese Vol 21 No 3, Mar 93 pp 45-49

[English abstract of article by Han Fang of EMC Research Section, Northern Jiaotong University, Beijing 100044; MS received Jun 91, revised Feb 92, supported by grant from NSFC]

[Text] The mechanism of radiated emission from a shielded cable caused by the pigtail effect is discussed and presented by treating the cable as equivalent transmission line and dipole antenna. It is observed that the radiated emission from PCs is produced mainly by common-mode current along the cable. The results of computation and measurement for the radiated emission are introduced, and shown to be in good agreement with theoretical analysis.

Key words: TEMPEST, EMC, EM radiation and leakage, Pigtail effect

Dynamics of Q-Switched MQW-LDA-Pumped Nd : YLF Laser and QS-GS Double Mechanism Action

40100078A Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese Vol 13 No 3, Mar 93 pp 193-198

[English abstract of article by Ma Jianwei, Zhou Fuzheng, Xue Qiang, and Zhang Zhengquan of Shanghai Institute of Optics and Fine Mechanics, CAS, Shanghai 201800, and Zhu Sayou of Shanghai Institute of Laser Technology, Shanghai 200233; MS received 27 Apr 92]

[Text] A Q-switched Nd : YLF laser pumped by homemade MQW-LDA [multi-quantum-well laser diode array] has been developed. Pulse width, peak power are studied in detail as functions of pumping energy, modulation depth, optical delay and reflectivity of the output coupling mirror. Stable Q-pulse output (fluctuation < 1 percent) is obtained with pulse energy of 0.8 μJ, FWHM of 70 ns, pulse repetition rate of 100 Hz and optical-to-optical efficiency of 2.5 percent. When Q-switch and gain switch are applied the peak pulse power is increased and pulse width decreased. A comparison of experimental data with rate-equation theory is made, and they agree well.

Near-IR KTP Single-Resonant Optical Parametric Oscillator

40100078B Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese Vol 13 No 3, Mar 93 pp 224-228

[English abstract of article by Yin Jiabin, Zhao Qingchun, He Huijuan, and Qian Linxing of Shanghai Institute of Optics and Fine Mechanics, CAS, Shanghai 201800, and Liu Yaogang and Wang Jiyang of the Laboratory of Crystal Materials, Shandong University, Jinan 250100; MS received 27 Apr 92]

[Text] The experimental results of an angle-tuning KTP single-resonant optical parametric oscillator (SRO) are reported and analysed. The SHG [single harmonic generation] of a Q-switched Nd : YAG laser is used as pump source. Limited by the bandwidth of the cavity mirror coatings, the tunable range is 785-1010 nm. The maximum output pulse energy is 2.4 mJ. The maximum energy conversion efficiency is 26.3 percent.

1992 Research Achievements of MMEI Former Institute 13 Highlighted

93P60222A Beijing ZHONGGUO KEXUE BAO [CHINESE SCIENCE NEWS] in Chinese 2 Apr 93 p 2

[Article by Liu Changan [0491 7022 1344]: "MMEI's Former Institute 13 Reaps Bumper Crop of Research Achievements"]

[Summary] MMEI's former Institute 13, aided by an economy-oriented, market-oriented production approach and horizontal and vertical research tasking (1992 horizontal/vertical revenues of 50 million yuan), in 1992 amassed a total of 76 specific research achievements, among which 46—including a silicon microwave high-power transistor, high-power quantum well diode laser, C-band gallium arsenide (GaAs) microwave high-power transistors, watt-class monolithic IC(s), and microwave power package(s)—passed the expert appraisals administered by a panel of over 80 experts from around the nation. Institute 13, a national leader in domestic development of GaAs microwave power transistors and a major contributor to the nation's overall level in sophisticated microelectronics, had the following specific breakthroughs last year: using internal-matching techniques, it developed a series of C-band GaAs power devices with an output power of 8-9 W and a gain of 10-11 dB in the 5.4-5.9 GHz range—domestically, the highest-performing devices for this frequency range and on a par with 80s internationally advanced standards; and using aluminum gallium arsenide (AlGaAs) grown by MOCVD [metallo-organic chemical vapor deposition] techniques, it developed a high-power single-quantum-well diode laser with a room-temperature CW optical output power exceeding 200 mW.

Beijing University Develops 99-Percent-Pure C_{60}, C_{70}

93P60226A Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 16 Apr 93 p 1

[Article by Fan Jian [5400 1696] and Tang Dongning [3282 2639 1337]: "Beijing University Develops High-Purity C_{60}, C_{70}: Major Boost for Nation's Superconductivity Research and Large Stride Into World's Front Ranks"; cf. early report in JPRS-CST-92-022, 18 Nov 92 p 3]

[Summary] Beijing University [Chemistry and Physics Department] researchers have succeeded in fabricating the fullerenes C_{60} and C_{70} with purities of 99.9 and 99 percent, respectively, via recrystallization to separate pure material and high-efficiency medium-pressure liquid phase chromatographic analysis. This recent achievement shows that China's fullerene research has taken a major stride into the world's front ranks. The economic value of high-purity fullerenes is indicated by the current international market price of US$1800/gram for high-purity C_{60} and US$7800/gram for high-purity C_{70}. It is understood that Beijing University, aided by grants from NSFC, the State S&T Commission, and the State Education Commission, first succeeded in synthesizing a mixed C_{60} and C_{70} compound in a small electrospark oven in June 1991, and then fabricated K_3C_{60} and Rb_3C_{60} superconductors in July 1991 [see JPRS-CST-91-017, 5 Aug 91 p 25 and JPRS-CST-91-018, 12 Sep 91 p 33], quickly stepping up production to 20 grams per day via a new independently developed electrospark oven. The new Beijing University achievement represents a major advance for the nation's superconductivity research in the areas of materials characteristics and theory. It is also understood that a panel of experts organized by [CAS] Academic Committee members have given this advanced achievement their highest appraisal for creativity and utilitarian value.

Yunnan Corp. Signs $30 Million Contract With AT&T for Cellular Mobile System

93P60229A Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 14, 14 Apr 93 p 5

[News brief by Shen Haiying [3088 3189 5391]: "AT&T, Yunnan Province Sign Contract for Delivery of Cellular Mobile Communications System"]

[Text] The U.S. firm AT&T announced on 10 March that it had reached agreement with the China Yunnan Province Import/Export Corp. on supply of [AT&T's] Autoplex (R) System 1000 cellular system to Yunnan Province. This signed US$30 million contract stipulates that AT&T will supply mobile switching equipment, base stations, and mobile telephones, as well as comprehensive province-wide mobile telephone services. AT&T will also provide complete system and service support, including plans, installation, training, and technical assistance. Yunnan Province estimates that initial installation of a cellular network based on AMPS will likely occur during 1993.

Preparation, Characterization, Applications of Ferroelectric Thin Films

93FE0476A Beijing WULI [PHYSICS] in Chinese Vol 21 No 11, Nov 92 pp 671-678

[Article by Liu Yimin [0491 4135 3046], Zhu Jianguo [2621 1696 0948], and Xiao Dingquan [5135 1353 0356] of the Department of Materials Science, Sichuan University, Chengdu 610064: "Preparation, Characterization, Applications of Ferroelectric Thin Films"]

[Excerpts] Abstract: The development of ferroelectric thin films is presented. The advantages and disadvantages of various methods are analyzed. Major problems of concern in the film preparation are presented. Methods to characterize basic parameters, physicochemical structures and physical properties of ferroelectric thin films are also described. Applications of ferroelectric thin films in pyroelectric sensors, optical switches and FRAM (ferroelectric random access memory) are discussed. Finally, the status of research on ferroelectric thin films in China is introduced.

Introduction

One of the major characteristics of a ferroelectric material is that there is a hysteresis between the intensity of its spontaneous polarization and the applied electric field. This electric hysteresis is very similar to the magnetic hysteresis exhibited by a ferromagnet. However, there is nothing in common between a ferroelectric material and a ferromagnetic material. In addition to ferroelectric properties, ferroelectric materials also exhibit piezoelectric properties, pyroelectric properties, linear photoelectric effects and nonlinear optical effects. Therefore, they have important applications in modern electronics and optoelectronics.

In the past, most ferroelectric devices were fabricated with bulk materials. As electronic and optoelectronic devices move toward miniaturization and integration, ferroelectric thin films of the order of microns are of considerable interest and become a focal point of research. Ferroelectric thin films have unique electric, optical, thermal and acoustic properties. They are expected to be compatible with semiconductors such as Si and GaAs. The potential applications of ferroelectric thin films in high-tech areas such as optoelectronics, integrated optics, and microelectronics are very bright. Hence, the scientific community, industry, military and government around the world are paying a great deal of attention to the development of ferroelectric thin films. This paper is a brief introduction of the development, preparation techniques, characterization and device applications of ferroelectric thin films. [passage omitted]

As techniques for synthesizing and characterizing ferroelectric thin films become more mature, as knowledge associated with the growth mechanism and structure of ferroelectric thin films accumulates, and as new device design principles are introduced, the piezoelectric, pyroelectric and photoelectric effects of ferroelectric thin films are being widely investigated and applied. Presently, a number of [domestic] higher learning institutions and research institutes are working in this area. The methods used primarily include RF (radio frequency) magnetron sputtering, multi-ion beam sputtering, sol-gel and MOCVD. The materials studied include PT, PZT, PLZT, $Bi_4Ti_3O_{12}$ and piezoelectric materials such as ZnO, AlN, etc. Sichuan University has developed the MIBRES (multi-ion-beam reactive sputtering) technique, which has been used to prepare a series of PLT thin films. Lead titanate and other ferroelectric thin films have been fabricated using sol-gel and RF magnetron sputtering at Xian Jiaotong University. Shanghai Institute of Silicates of the Chinese Academy of Sciences has prepared PLZT ferroelectric thin films by using RF magnetron sputtering. Huazhong University of Science and Technology and Hubei University have used the sol-gel technique to prepare $BaTiO_3$ and PZT ferroelectric thin films. Nanjing University and Shandong University are developing techniques to fabricate ferroelectric thin films using MOCVD. Sichuan Institute of Piezoelectricity, Acoustics and Optics is investigating an improved RF magnetron sputtering technique to prepare PZT thin films. Substantial progress in preparation, characterization and application of ferroelectric thin films in China can be expected.

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RF Quadrupole Accelerating Structure Prototype Certified

93FE0476B Beijing WULI [PHYSICS] in Chinese Vol 21 No 11, Nov 92 p 689

[Article by Chen Siyu [7115 1835 5148] of the Department of Mathematical Science, the Natural Science Foundation of China: "RF Quadrupole Accelerating Structure Prototype Certified"]

[Text] Abstract: After years of hard work at the Technical Physics Department of Beijing University and the Institute of Heavy-Ion Physics under the direction of Professor Chen Jiaer [7115 0163 3167], the integral separation ring radio-frequency quadrupole (RFQ) accelerating structure project that is funded by the Natural Science Foundation of China (NSFC) has reached an important phase. A full-scale prototype RFQ accelerating structure has been successfully designed and developed. Furthermore, it has been tested at full power. A team of experts was formed by the NSFC to review this accomplishment on 17 March 1992.

An RFQ accelerating structure is a novel accelerating structure that uses the radial component of the RF field to confine low-energy particles and the axial electric field to accelerate the particle beam. Russian scientist M. Kapchinskij was the first to introduce this concept in 1970. After repeated experimentation and improvement, prototypes were built in Russia and the United States. In 1980, the first four-wing RFQ accelerator was constructed at the Los Alamos National Laboratory. It resulted in a 26 mA high-power proton beam with 87 percent current efficiency. It has a number of advantages including simple structure, compact size and ease of use.

The axially symmetric RF quadrupole field alternates with time in an RFQ structure. When a particle moves along axially, the effect of the time-alternating field on its radial motion behaves like a spatial alternating field. With proper parameters, this radial effect can be used to focus the particle beam. In addition, because the electrode tip is shaped in a wavy form axially, the gap between two opposing electrodes is periodically varied along the axis. Furthermore, the maximum and minimum gap between electrodes are arranged in an alternating manner to produce an axial electric field for particle acceleration.

Because the RFQ structure concentrates beam confining, acceleration, transverse matching and focusing in one cavity, it has advantages such as high beam current (to several hundred mA), high quality (normalized emissivity of about 10^{-1} π mm-mrad) and high current utilization rate (above 90 percent). It can accelerate a beam directly out of an ion source. Many laboratories are using RFQ accelerators to replace bulky high-voltage multipliers as injectors for high-energy accelerators. RFQ accelerators are also being rapidly adopted in heavy-ion-beam physics and ion implantation.

In 1984, the accelerator group at Beijing, based on their study of the heavy-ion separation ring resonant cavity, proposed an RFQ accelerating structure that employs a quadrupole to replace the drift tube. Beginning in 1986, this group, with continuous funding from NSFC, has conducted research on this RFQ accelerating structure, including a series of theoretical, experimental and technological studies of particle kinetics design, RF characteristics of the cavity as a function of geometry, and technological feasibility analysis in order to complete the physical and technological design and construction of this high-power cavity and to develop a prototype.

Nine experts, including Xie Jialin [6200 1367 7792], Wang Ganchang [3769 3227 2490], and Hu Jimin [5170 3444 3046], unanimously believe that:

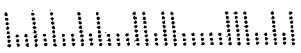
1. The "integral separation ring" RFQ accelerating structure proposed by researchers at Beijing University in 1984 is a unique structure. Upon completion of the series of experiments and studies, the feasibility of this structure has been fully demonstrated. It has advantages such as compactness, good electrical stability, low operating frequency and suitability for heavy-ion acceleration.

2. Major high-frequency characteristics of the high-power RFQ structure that has been successfully designed and developed include: operating frequency f_0 = 26 MHz, quality factor = 1358, specific circuit resistivity ρ = 204 kΩ-m, and voltage between electrodes V = 82 kV. These parameters are comparable to the characteristics of other advanced RFQ structures in the world. In particular, the tunable range (24-40 MHz) and load factor under pulsing (15-25 percent) are at the leading edge of this technology.

3. The internal water-cooled "micro fan" electrode structure is a novel design that performs well.

4. The widely used kinetics program, PARMTEQ, has been transplanted and modified in this work to run on a PC. Not only can it run reliably on a PC, but it also has advantages such as high-speed computation, strong graphics capability and convenient man-machine dialog. It is suitable for widespread use.

The RFQ accelerating structure prototype certification committee believes that the research done by this group has filled the void in RFQ accelerating technology in China, particularly in experimental and technological aspects. It provides some beneficial experience and a technical base for the development of this accelerator technology. It is recommended that the government continue supporting this program to allow the further development and application of this accelerator technology.



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